If you pour a cup of coffee, it cools more rapidly at first, then less rapidly, finally approaching room temperature. You can show the relationship between coffee temperature and time *graphically.* Figure 1-1a shows the temperature, y, as a function of time, x. At $x = 0$, the coffee has just been poured. The graph shows that as time goes on, the temperature levels off, until it is so close to room temperature, 20°C, that you can't tell the difference.

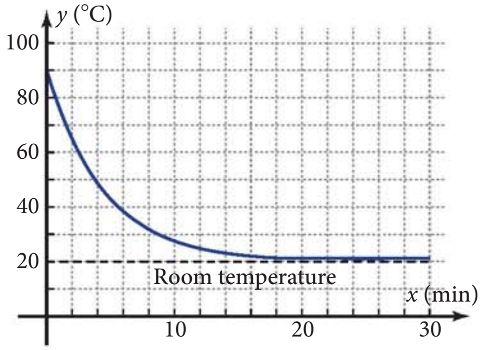

Figure 1-1a

This graph might have come from numerical data, found by experiment. It actually came from an **algebraic** equation, $y = 20 + 70(0.8)^x$.

x (min)	y (°C)
0	90.0
5	42.9
10	27.5
15	22.5
20	20.8

From the equation, you can find **numerical** information. If you enter the equation into your grapher and then use the table feature, you can find these temperatures, rounded to 0.1°C.

Functions that are used to make predictions and interpretations about something in the real world are called **mathematical models.** Temperature is the **dependent variable** because the temperature of the coffee depends on the time it has been cooling. Time is the **independent variable.** You cannot change time simply by changing coffee temperature! Always plot the independent variable on the horizontal axis and the dependent variable on the vertical axis.

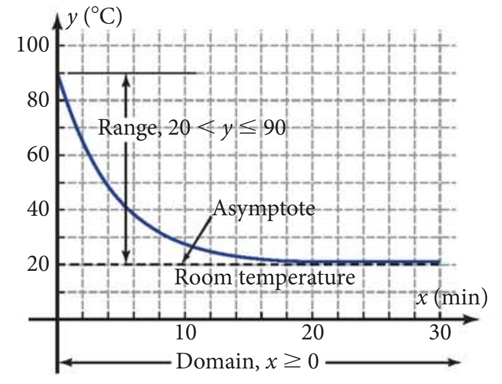

Figure 1-1b

The set of values the independent variable of a function can have is called the **domain.** In the coffee cup example, the domain is the set of nonnegative numbers, or $x \geq 0$. The set of values of the dependent variable corresponding to the domain is called the **range** of the function. If you don't drink the coffee (which would end the domain), the range is the set of temperatures between 20°C and 90°C, including 90°C but not 20°C, or $20 < y \leq 90$. The horizontal line at 20°C is called an **asymptote.** The word comes from the Greek *asymptotos,* meaning "not due to coincide." The graph gets arbitrarily close to the asymptote but never touches it. Figure 1-1b shows the domain, range, and asymptote.